

Objective

Chapter 3.1

◆ Objective:

- Students will know the stresses that cause deformation in rocks

3.1 Rock Deformation

Factors Affecting Deformation

- ◆ Factors that influence the strength of a rock and how it will deform include temperature, confining pressure, rock type, and time.
 - **Deformation** is a general term that refers to all changes in the original shape and/or size of a rock body.
 - Most crustal deformation occurs along plate margins.
 - **Stress** is the force per unit area acting on a solid.
 - **Strain** is the change in shape or volume of a body of rock as a result of stress.

3.1 Rock Deformation

Factors Affecting Deformation Review

- ◆ Deformation is...

- ◆ Stress is...

- ◆ Strain is...

3.1 Rock Deformation

Factors Affecting Deformation Review

- ◆ Deformation is...any changes in the original shape and/or size of a rock body.
- ◆ Stress is...
- ◆ Strain is...

3.1 Rock Deformation

Factors Affecting Deformation Review

- ◆ Deformation is...any changes in the original shape and/or size of a rock body.
- ◆ Stress is...the force acting (pushing/pulling) on a rock.
- ◆ Strain is...

3.1 Rock Deformation

Factors Affecting Deformation Review

- ◆ Deformation is...any changes in the original shape and/or size of a rock body.
- ◆ Stress is...the force acting (pushing/pulling) on a rock.
- ◆ Strain is...change in shape or size of a body of rock as a result of stress.

3.1 Rock Deformation

Factors Affecting Deformation

◆ Temperature and Pressure

- Rocks deform permanently in two ways: brittle deformation and ductile deformation.
- Brittle deformation is the fracturing of an object once its strength is exceeded.
- Ductile deformation is a type of solid state flow that produces a change in the size and shape of an object without fracturing the object.

3.1 Rock Deformation

Factors Affecting Deformation Review

- ◆ Deformation = Permanent Change
- ◆ Brittle Deformation = break or Fracture
- ◆ Ductile Deformation = Bend or reshape

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3.1 Brittle Deformation



3.1 Ductile Deformation



3.1 Rock Deformation

Factors Affecting Deformation

◆ Rock Type

- Mineral composition and texture of a rock also greatly affect how it will deform.

◆ Time

- Forces that are unable to deform rock when first applied may cause rock to flow if the force is maintained over a long period of time.

3.1 Rock Deformation

Types of Stress

- ◆ The three types of stresses that rocks commonly undergo are tensional stress, compressional stress, and shear stress.
- ◆ Where have we heard these before?

3.1 Rock Deformation

Types of Stress

- ◆ Tensional Stress = Spreading Centers
- ◆ Compressional Stress = Subduction Zones
- ◆ Shear Stress = Transform Faults

3.1 Rock Deformation

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3.1 Rock Deformation

Types of Stress

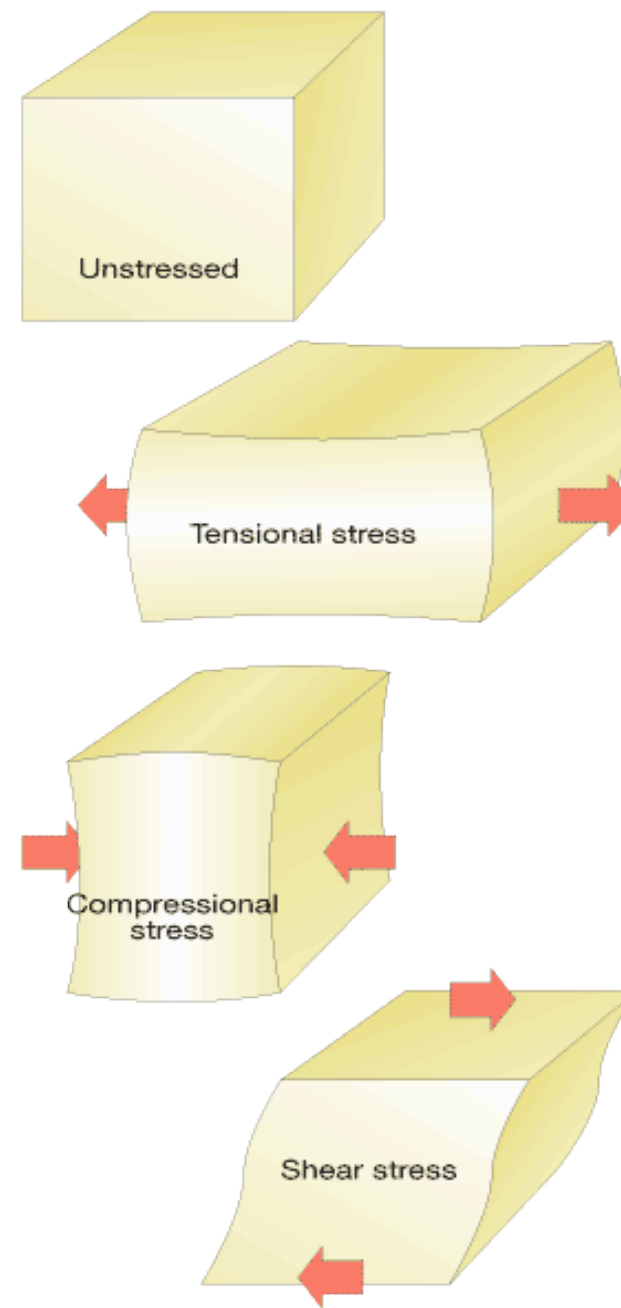
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3.1 Rock Deformation

Types of Stress

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Types of Stress



3.1 Rock Deformation

Factors Affecting Deformation Review

- ◆ Deformation = Permanent Change
- ◆ Brittle Deformation = Break or Fracture
- ◆ Ductile Deformation = Bend or reshape
- ◆ Tensional Stress = Pull Apart
- ◆ Compressional Stress = Push Together
- ◆ Shear Stress = Push Opposite Directions

3.1 Rock Deformation

Factors Affecting Deformation Review

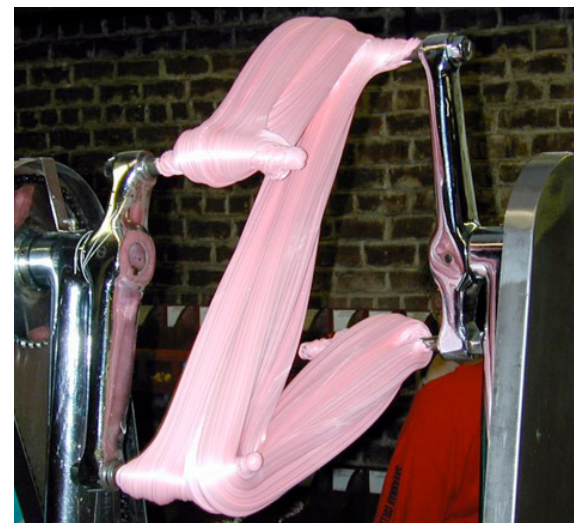
◆ Deformation = Permanent Change



3.1 Rock Deformation

Factors Affecting Deformation Review

- ◆ Ductile Deformation
= Bend for Reshape



- ◆ Brittle Deformation
= Break or Fracture



3.1 Rock Deformation

Factors Affecting Deformation Review

◆ Tensional Stress = Pull Apart



3.1 Rock Deformation

Factors Affecting Deformation Review

◆ Compressional Stress = Push Together



3.1 Rock Deformation

Factors Affecting Deformation Review

- ◆ Shear Stress = Push Opposite Directions

